

AN ANALYSIS OF THE SPEECH OF CEREBRAL
PALSIED INDIVIDUALS IN AN EFFORT TO
DETERMINE EMPLOYABILITY LEVELS

By
JACK F. BENSEN

A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA
August, 1960

ACKNOWLEDGMENTS

The writer should like to express his sincere appreciation to Dean L. L. Hale who was kind enough to act as supervising chairman in addition to his numerous duties as Dean of Men and now Dean of Student Personnel. Dean Hale has seen the writer through many years of development and has always been most helpful, especially at those times when advice or counseling was needed, and the writer is most grateful for his help.

The writer wishes to acknowledge his indebtedness to Dr. Roy E. Tew, Dr. Richard J. Anderson, Dr. James C. Dixon, Dr. Charles K. Thomas for their help in reading the manuscript and their suggestions for its design and improvement and to Dr. M. W. Buck for his help throughout the years.

To Professor H. P. Constans, who has been more than helpful in guiding the writer through his entire program for his Ph.D., an expression of gratitude.

The writer would like to express his appreciation to the personnel men who helped with the experiment and to Dr. Betty Philips and Dr. Walter Amster for spending many hours judging the speech of the subjects. Without their help it would have been impossible to do this study. A

further expression of gratitude is extended to Dr. Betty Philips and to her husband, Dr. C. Lee Philips, for suggesting the possibility of such an experiment and their aid in the design.

A special note of appreciation is extended to Dr. William L. Shea, who not only served as a judge, but also made many helpful suggestions and was a most understanding "boss" during this period.

Finally, to his wife and children, who have been most understanding during this time, the writer says, "Thank you."

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS.	11
LIST OF TABLES	vi
Chapter	
I. INTRODUCTION.	1
II. PROCEDURE	14
Selection of Subjects	14
Preparation of Speech Samples	15
Selection of Judges	16
Taping and Judging the Speech Samples.	16
Division of the Subjects into Groups	20
Evaluation of Measurements.	22
III. RESULTS	27
Grouping the Subjects	27
Statistical Procedures.	28
Articulation Scores	28
Rhythm Scores	38
Rate Scores	47
Pitch Scores.	55
Quality Scores.	62
IV. SUMMARY AND CONCLUSIONS	70
Summary	70
Conclusions	72

TABLE OF CONTENTS--Continued

	Page
APPENDIX	
A. HARVARD S. I. SENTENCES.	77
B. ARTICULATION TEST.	78
C. JUDGES' RATING SCALES.	79
D. JUDGES' RATING SCALES.	80
E. COMPOSITE RATINGS FOR EACH SUBJECT BY ALL JUDGES ON ALL FACTORS.	81
BIBLIOGRAPHY.	83

LIST OF TABLES

Table	Page
1. Percentage of Agreement on 1750 Judgments by Personnel Men Ranking Levels of Employ- ability.	21
2. Percentages of Agreement of 3400 Judgments of Articulation by each of Three Judges. .	24
3. Ranking of Subjects by Personnel Men. . . .	27
4. Total Articulation Scores.	29
5. Rank Order of Articulation Scores.	30
6. Rank Order of Groups 1 and 2, Articulation Scores	32
7. Rank Order of Groups 1 and 3, Articulation .	33
8. Rank Order of Groups 1 and 4, Articulation .	34
9. Rank Order of Groups 2 and 3, Articulation .	35
10. Rank Order of Groups 2 and 4, Articulation .	36
11. Rank Order of Groups 3 and 4, Articulation .	37
12. Ratings of Rhythm Scores	39
13. Rank Order of Rhythm Scores.	40
14. Rank Order of Groups 1 and 2, Rhythm	41
15. Rank Order of Groups 1 and 3, Rhythm	42
16. Rank Order of Groups 1 and 4, Rhythm	43
17. Rank Order of Groups 2 and 3, Rhythm	44
18. Rank Order of Groups 2 and 4, Rhythm	45
19. Rank Order of Groups 3 and 4, Rhythm	46

LIST OF TABLES--Continued

Table	Page
20. Rate of Speech, Number of Words per Minute.	47
21. Rank Order of Scores of Rate.	48
22. Rank Order of Groups 1 and 2, Rate.	49
23. Rank Order of Groups 1 and 3, Rate.	50
24. Rank Order of Groups 1 and 4, Rate.	51
25. Rank Order of Groups 2 and 3, Rate.	52
26. Rank Order of Groups 2 and 4, Rate.	53
27. Rank Order of Groups 3 and 4, Rate.	54
28. Rank Order of Scores on Pitch	55
29. Rank Order of Groups 1 and 2, Pitch	56
30. Rank Order of Groups 1 and 3, Pitch	57
31. Rank Order of Groups 1 and 4, Pitch	58
32. Rank Order of Groups 2 and 3, Pitch	59
33. Rank Order of Groups 2 and 4, Pitch	60
34. Rank Order of Groups 3 and 4, Pitch	61
35. Scores of Quality Ratings	62
36. Rank Order of Scores of Quality Ratings	63
37. Rank Order of Groups 1 and 2, Quality	64
38. Rank Order of Groups 1 and 3, Quality	65
39. Rank Order of Groups 1 and 4, Quality	66
40. Rank Order of Groups 2 and 3, Quality	67

LIST OF TABLES--Continued

Table	Page
41. Rank Order of Groups 2 and 4, Quality	68
42. Rank Order of Groups 3 and 4, Quality	69

CHAPTER I

INTRODUCTION

The condition now referred to as cerebral palsy was first recognized by Dr. William John Little,¹ a London physician. He described the spastic diplegic syndrome. For many years cerebral palsy was known as Little's disease. In 1889, Sir William Osler used the term "the cerebral palsies."² Cerebral palsy was selected by Dr. Winthrop Phelps³ and is the most common term in use today. According to the definition developed by the American Academy of Cerebral Palsy, cerebral palsy is: "Any abnormal alteration of movement or motor function arising from defect, injury, or disease of the nervous

¹W. J. Little, "On the Influence of Abnormal Parturition, Difficult Labor, Premature Birth, and Asphyxia Neonatorum, on the Mental and Physical Condition of the Child, Especially in Relation to Deformities," Lancet, II (October, 1861), 378-380.

²W. Osler, The Cerebral Palsies of Children, A Clinical Study from the Infirmary of Nervous Diseases (Philadelphia: P. Blakiston and Co., 1889), p. 1.

³T. Fay, "Cerebral Palsy: Medical Considerations and Classification," American Journal of Psychiatry, CVII (September, 1950), 181.

tissues contained in the cranial cavity."⁴ The effects of such an alteration on the speech of an individual so inflicted can range from non-contributing to very severe, depending upon the degree of abnormal alteration.

Before analyzing the speech of the cerebral palsied individual and its relation to employability, it is necessary to determine (1) whether speech is a factor in the employment of these people and (2) whether employability is of itself a problem.

"Most counselors looking to ultimate job placement for cerebral palsied clients consider the two most important areas of physical capacity to be the use of hands and speech."⁵ This statement, of course, is an oversimplification of the problem. The problems of the cerebral palsied individual are manifold and all need to be considered when vocational training and placement are concerned. However, Brinn, and Smith⁶

⁴T. Fay, "Desperately Needed - Research in Cerebral Palsy," Cerebral Palsy Review, XIV (March, 1953), 11.

⁵J. A. Garrett, "Realistic Vocational Guidance and Placement," Cerebral Palsy Its Individual and Community Problems, ed. W. M. Cruickshank and G. M. Raus (Syracuse University Press, 1955), p. 431.

⁶G. Brinn and E. E. Smith, Opportunities Limited, A Study of Employment Problems of the Cerebral Palsied and Epileptic (San Francisco: California Society for Crippled Children, 1951).

found that speech handicaps were a greater barrier to employment than were other physical handicaps. On the other hand, Whitehouse⁷ says that the greatest difficulty in placing a person with cerebral palsy is not physical disability but psychological maladjustment. Curtis agrees with Whitehouse and presents this aspect of the problem in a very striking manner. Curtis states:

"Through the painstaking work that has been put into each case, many interesting and revealing things have come to light. In far too many instances, so many, in fact, that it might be said to be common to almost all, the parents of these applicants have not had the vaguest notion of how to prepare their children to deal with the real world. In their anxieties, their guilt about their afflicted children, they have so over-protected them as to cripple them emotionally, psychologically and, above all, vocationally. The cerebral palsied, even when they are fully grown and presumably adult, are so over-dependent upon their parents that it has become almost the first order of business to try to break down this checkmating attitude. Such things as a parent accompanying a twenty-five year old capable man to an interview has not been infrequent. These people, because of having been so sheltered that they have not been allowed to make their own mistakes through which a child learns, do not know how to conduct themselves with others. They do not know how to respond to questions put to them; they are ill-at-ease and often terrified in the presence of strangers; they do not know how to dress or groom themselves properly. They have never heard that it is essential to be on time for an interview, so they may be several minutes, hours, or even days late for an appointment. Above all, they cannot make decisions but must refer to their parents before committing themselves in any way. These, and the deeper emotional

⁷ F. A. Whitehouse, "Vocational Guidance for the Cerebral Palsied," Association for the Aid of Crippled Children, Proceedings of the Cerebral Palsy Institute (New York, 1950), pp. 127-128.

problems of which they are mere symptoms, frequently constitute far greater vocational handicaps than does the cerebral palsy condition itself.⁸

Another portion of the problem of employment is stated by Kessler:

The greatest problem is prejudice: the prejudice of the man in the street. That prejudice is not inborn; it is the result of ignorance, misinformation and lack of information. It is the greatest bar to the employment of the cerebral palsied adult, even though he is skilled, trained and-or has a high I. Q. and all the necessary qualifications for performing useful work.⁹

In contrast to these statements, the following points up a different aspect of the problem:

We heard statements about road blocks, and statements about road blocks in terms of management. I say that is not true. I say the fault does not lie in terms of management only. It is the fault of all of us. . . . Why is it our fault? Because we are learning, we are groping and don't know the answer. We can't expect management to accept CP's or any other type of disabled if we don't know the person, or don't know what type of objective to recommend, or don't teach them the proper types of skills.¹⁰

⁸ L. W. Curtis, Vocational Placement of the Cerebral Palsied, (New York: United Cerebral Palsy of New York City, Inc., 1954), p. 4.

⁹ H. H. Kessler, "Rehabilitation and Job Placement," Conquering Physical Handicaps, Official Proceedings of the First Pan-Pacific Rehabilitation Conference (Sidney, Australia: The Australian Advisory Council for the Physically Handicapped, 1958), p. 207.

¹⁰ Vocational Problems of the Adult With Cerebral Palsy (New York: United Cerebral Palsy of New York City, Inc., 1953), p. 15.

Tragott Vorwerk probably sums this all up best when she says, "The placement of the cerebral palsied in employment is a very serious problem."¹¹

The need for vocational help for the cerebral palsied individual is becoming more apparent as we understand these people better. Fleischer says:

That cerebral palsy, as the affected individual grows older, becomes a vocational and social, rather than a medical, problem is a concept which is constantly growing in the minds of many. The individual with cerebral palsy has been the recipient of medical, therapeutical, educational and some psychological services, but he has not been guided, as a rule, into making occupational choices based upon reasonable and realistic evaluations and self-evaluations.¹²

This need for guidance is substantiated by Glick when she reports:

For the total unemployed group there was a need for an appraisal of each individual's potentialities through psychological tests where applicable, counseling and case work. Ninety-one people in the unemployed group, when asked what type of work they wanted, openly stated, "Any job at all that I can do." When asked to be more specific as to their preference, many frankly admitted that they did not know. In view of the many limitations of the adult cerebral palsied individual and the terrific employer resistance to hiring these individuals it is essential that they be well prepared for some specific type of employment and that, through training they reach the optimum degree of skill compatible with their disabled state.¹³

¹¹F. M. Tragott Vorwerk, "The Case of the Cerebral Palsied in South Africa," Conquering Physical Handicaps, Official Proceedings of the First Pan-Pacific Rehabilitation Conference (Sidney, Australia: The Australian Advisory Council for the Physically Handicapped, 1958), p. 547.

¹²E. Fleischer, "Guidance and Rehabilitation in Cerebral Palsy," Cerebral Palsy Review, XVII (September, 1956), 120.

¹³S. J. Glick, Vocational, Educational, and Recreational Needs of the Cerebral Palsied Adult (New York: United Cerebral Palsy of New York City, Inc., 1953), p. 42.

Avery agrees that more and better vocational guidance is necessary, not only for the cerebral palsied individual, but for all handicapped people:

A well organized vocational guidance department is essential for the future of all handicapped individuals. This should be based on aiding the student in discovering his interests, aptitudes and economic abilities correlated with his physical capacities.¹⁴

The need for more testing to find the range of the handicapped persons' ability is stated by Gilmour:

Physically disabled people offered to employers should be vocationally tested and properly rehabilitated before employment is sought, and that those sponsoring their employment should be sure that the jobs suggested for them are genuinely within the range of their capacities.¹⁵

Cook corroborates this by saying:

All placement, if it is to be really effective, must be selective placement in which there is a careful matching of the requirements of the employer and the conditions of the work with the needs, circumstances and capabilities of the individual.¹⁶

Allen points out the need of the cerebral palsied individual to be shown, and to accept, a more realistic attitude and understanding of his problem:

A realistic vocational choice must be based on (1) a realistic or objective understanding of one's interests,

¹⁴ B. A. Avery et al., "Looking Ahead Vocationally," Cerebral Palsy Review, XVII (September, 1956) 125-126.

¹⁵ S. M. Gilmour, "The Employers Responsibility in the Rehabilitation of the Disabled," Conquering Physical Handicaps, Official Proceedings of the First Pan-Pacific Rehabilitation Conference (Sidney, Australia: The Australian Council for the Physically Handicapped, 1958), p. 338.

¹⁶ P. H. Cook, "The Placement of the Disabled," Conquering Physical Handicaps, Official Proceedings of the First Pan-Pacific Rehabilitation Conference (Sidney, Australia: The Australian Advisory Council for the Physically Handicapped, 1958), p. 327.

capacities and strengths and (2) an acceptance, as well as understanding, of one's limitations and weaknesses as related to occupational requirements and job opportunities.¹⁷

If what Allen stated could be achieved, Curtis' (page 3) and Glick's (page 5) observations might be considerably changed. Instead of being so emotionally, socially, and vocationally immature, these people might have a better insight and be able to help themselves more.

Christman sums this up very well and points out the direction which should be taken:

Characteristically the person with cerebral palsy is an individual with "multiple handicaps." The first job is to ascertain the unique situation of the particular individual with whom you are dealing. What is his intellectual functioning, is there brain damage and how extensive, how is his speech, what is his physical involvement, the home situation, what does he know about the world, etc.? In other words, it is important to know where you have to start from, and what you have to work with, considerations which are always open to revision as you go along.¹⁸

The importance of vocational guidance, as can be seen from the preceding quotation, is readily discernible. This fact leads us to the problem of what goes into effective guidance? How does it work? Super says, "Vocational guidance has two fundamental purposes: to help people make good vocational adjustments and to facilitate the smooth functioning of the social economy through the

¹⁷G. M. Allen et al., "Guidance Activity for Realistic Vocational Choices," Cerebral Palsy Review, XVII (September, 1956), 127.

¹⁸D. Christman et al., "Counseling Problems," Cerebral Palsy Review, XVII (September, 1956), 130.

effective use of manpower."¹⁹ He goes on to state, "The well trained diagnostician therefore uses a variety of techniques for gathering data about a person he is going to counsel."²⁰ A complete outline of an ideal counseling situation is stated in Proceedings of the Case Demonstration Conference on the Vocational Problems of the Adult With Cerebral Palsy.²¹ In this pamphlet, it is said that the role of the vocational counselor as a member of the rehabilitation team is to effect the vocational adjustment of his client. The counseling process involves the securing of all available background material. The following steps are recommended:

1. Diagnosis. This involves securing all of the background material available: scholastic, medical, social, employment, psychometric, etc.

2. An appraisal of his maturity: social, educational, physical, and intellectual.

3. An inventory of performance taking into consideration the specific abilities of the individual.

4. An inventory of the factors which might be interfering with his performance. In this instance one checks sensory-motor, educational, social, physical, emotional, speech, and intelligence factors. A check is made on his

¹⁹D. E. Super, Appraising Vocational Fitness (New York: Harper and Brothers, 1949), p. 1.

²⁰Ibid., 12.

²¹Adult Vocational Advisory Board, Proceedings of the Case Demonstration Conference on the Vocational Problems of the Adult With Cerebral Palsy (New York, 1953), pp. 27-28.

achievement in school, to see if he was promoted academically or automatically.

5. Analysis of the first four steps by the rehabilitation team.

6. Prognosis. The team makes a judgment as to the individual's employability. Is he unemployable, can he work in a sheltered workshop, or is he employable in competitive industry? If he is regarded as unemployable and untrainable for employment, then vocational counseling is stopped.

7. Setting up objectives. After the vocation is selected the person must either be trained or attempts made to place him in the occupation deemed most suitable for him.

8. Evaluation and follow-up.

That vocational guidance is very necessary and also involved has been pointed out. Now let us see how many people receive such counseling. Two reports show a considerable lack of guidance. Berko found "Of 591 individuals surveyed, 69.3 per cent never received any vocational guidance."²² Glick found "Only 28 or 14 per cent of the 200 people interviewed had any form of vocational guidance. . . . The one service requested most by the group was vocational guidance and help in finding out what they were best able to do."²³

²²F. G. Berko and M. J. Berko, "An Abstract of the Adult Occupational Inventory," Cerebral Palsy Review, XVII (September, 1956), 119.

²³Glick, op. cit., p. 34.

If vocational guidance is made available, the possibility of employment must be taken into consideration. Is it possible for a cerebral palsied individual to gain employment in competitive industry? Cook gives an account of this:

Recently I had reason to review the occupations in which cerebral-palsied persons had been placed. I was a little surprised with what I found: in 75 placements of males and females, no less than 31 different occupations were covered; just to mention some of them: clerk, storeman, herd tester, proof reader's assistant, wire cutter, gardener, french polisher, spray painter, cashier, jeweler's assistant, switchboard operator, stenographer, nursemaid, process worker.²⁴

For the cerebral palsied individual, this problem of employment is of great importance. These questions must be answered: (1) what type of job is he best suited for and (2) what are his possibilities of obtaining and holding this job? Cardwell maintains that "Evaluation for vocational potentialities is best done when vocational rehabilitation is considered by the team as one aspect of the individual's total rehabilitation."²⁵ The team concept is described by Longmuir:

Gathering together the requisite number of people suitably qualified in their profession or calling is only the first step in forming a rehabilitation team. The paramount task is to teach all these people to think, act, and report as a group, all practicing primary rehabilitation principles which

²⁴Cook, op. cit., p. 328.

²⁵V. E. Cardwell, Cerebral Palsy (New York: The North River Press, Inc., 1956), p. 439.

take precedence over practice of their profession in any narrow academic sense.²⁶

Dr. Betty Philips, head of the Speech Clinic of the United Cerebral Palsy Association of Miami, stated, in a conversation, that one of her problems when working with such a team was answering the question, "Is this person's speech good enough for a certain job?" The only basis she has for an answer is subjective opinion. There are no objective criteria available. The only scales to be found are as follows: Achilles²⁷ used a scale of good, fair, poor, for articulation and communication; McCarthy²⁸ in a test for general language development rates decoding, association, and encoding as good, fair, poor; Crothers and Richmond²⁹ used normal, good, fair, poor as a rating of employed cerebral palsied patients. Another scale that is

²⁶ D. Longmuir, "Pre-Vocational Treatment and Assessment," Conquering Physical Handicaps, Official Proceedings of the First Pan-Pacific Conference (Sidney, Australia: The Australian Advisory Council for the Physically Handicapped, 1958), p. 316.

²⁷ R. F. Achilles, "Communicative Anomalies of Individuals With Cerebral Palsy," Cerebral Palsy Review, XVI (September, 1955), 15-24.

²⁸ J. J. McCarthy, "A Test for the Identification of Defects in Language Usage among Young Cerebral Palsied Children," Cerebral Palsy Review, XXI (January, 1960), 3-5.

²⁹ B. Crothers and R. S. Richmond, The Natural History of Cerebral Palsy (Cambridge, Mass.: Harvard University Press, 1959), p. 271.

used is: (5) Intelligible for prime vocational use--normal.
 (4) Intelligible but slightly awkward--secondary vocational
 use. (3) Intelligible but awkward--little vocational use.
 (2) Barely intelligible. (1) Unintelligible.³⁰ The speech
 rating scale at the United Cerebral Palsy Association of
 Miami is:

"1. Speech is intelligible. Client can be understood without difficulty by a stranger. Speech is well developed with clear enunciation. 2. Speech is intelligible. Client can be understood without difficulty by a stranger; however, minor impediments are noticeable. 3. Client has some difficulty in being understood by a stranger. While his speech is awkward, he is able to get his ideas across in speech. 4. Speech is hard for a stranger to understand. It is difficult for the client to get ideas across in speech as his speech is barely intelligible. 5. Almost totally unable to communicate by speech. The client's speech is unintelligible or the client is totally without speech."³¹

Richards³² had speech rated as normal, moderate, severe. Huber states, "Speech correction, as a science, is comparatively recent and its workers have been so busy developing a rationale of diagnoses and therapy that there has been

³⁰Institute for the Crippled and Disabled, Fourth Annual Report (New York: Cerebral Palsy Work Classification and Evaluation Report, 1959), p. 2.

³¹Cerebral Palsy Work Classification Report, used at U. C. P. Miami, Fla.

³²E. Richards, "A Study of a Selected Group of Cerebral Palsied Persons to Determine Minimal Occupational Profiles and Abilities Associated With Vocational Success" (Unpublished Ph.D. dissertation, Indiana University, 1955), p. 67.

little time for exploration in the realm of vocational guidance."³³ Leith says, "There have been fewer investigations in cerebral palsy than any other speech disorder, and many of those which have been reported were long on verbiage and short on controlled experimental study."³⁴

Dr. Philips' statement suggested the desirability of obtaining some objective measurement of the cerebral palsied individual's speech in relation to his employability. Such a measurement would be helpful, not only for the speech pathologist, but for the cerebral palsied individual as well.

This study is designed to explore the possibility of obtaining a more objective measurement of the speech of the cerebral palsied individual and its effect on his employability. The purpose of the experiment may be stated as follows: to ascertain whether there are any measurable factors of the audible communicative speech of cerebral palsied individuals which may be determinants of levels of employability, and, if so, what those factors are.

³³M. W. Huber, "Speech and Vocational Placement," The Crippled Child, XXIV (October, 1949), 32.

³⁴W. R. Leith, "The Role of Research in the Clinical Program for the Individual with Cerebral Palsy," Cerebral Palsy Review, XVI (March, 1955), 10.

CHAPTER II

PROCEDURE

Selection of Subjects

Fifty adult cerebral palsied individuals eighteen years of age or older were selected as subjects. They were selected on the basis of availability without consideration of type of cerebral palsy, degree of physical impairment, or mental ability. The relation between type of cerebral palsy and speech has been studied by Leith and Steer,¹ and they found no significant difference between the types of cerebral palsy and their deviation from normal. While degree of impairment and mental ability are definitely contributing factors to the individual's speech, they are not what this study is designed to measure. This study is concerned only with the cerebral palsied individual's audible communicative speech and not with the organic basis of his handicap. All the subjects chosen had been diagnosed as having cerebral palsy by the large professional staff of the United Cerebral Palsy Clinic of Miami, Florida.

¹W. R. Leith and M. D. Steer, "Comparison of Judged Speech Characteristics of Athetoids and Spastics," Cerebral Palsy Review, XIX (September, 1958), 20.

Preparation of Speech Samples

A picture articulation test was designed according to the criteria set up by Wright.² The test was designed so that those subjects having difficulty in reading would not be penalized and so that speech rather than reading ability would be judged. Ten of the Harvard Sentence Intelligibility sentences were used to obtain a sample of connected speech. These are presented and described in detail by Abrams³ and listed by Davis.⁴ Care was taken to include all vowel and consonant sounds in these sentences. These sentences were chosen because of their wide use as a testing implement. Burgi and Matthews⁵ obtained a correlation of .88 between them and an articulation test in a study done on cerebral palsied speech.

²H. Wright, "Reliability of Evaluations During Basic Articulation and Stimulation Testing," Journal of Speech and Hearing Disorders, Monograph Supplement IV (January, 1954), 21.

³M. H. Abrams et al., "Speech in Noise: A Study of the Factors Determining Its Intelligibility," (Psycho-Acoustic Laboratory, Harvard University, OSRD Rep. No. 4023, PB 19805, 1944), 14-23.

⁴H. Davis (ed.), Hearing and Deafness (New York: Rinehart Books, Inc., 1947), pp. 482-484.

⁵B. J. Burgi and J. Matthews, "Predicting Intelligibility of Cerebral Palsied Speech," Journal of Speech and Hearing Research, I (December, 1958), 338.

Selection of Judges

Three judges were used for analyzing the articulation tests and reading passages. Each judge has a doctorate degree in speech pathology and at least ten years' experience; thus, they can be considered highly qualified judges. Thirty-five personnel men and employers were selected to rate the subjects for employability levels. These judges were selected on the basis of actually selecting employees as a function of their occupation. The personnel men used for this study represent varied types of industry and business. Companies represented were airline, banks, department store, light industries, sheet metal works, power company, telephone company, hospitals, food stores, and restaurants. The number of employees in each of the businesses ranged from five to 15,000.

Taping and Judging the Speech Samples

A model 300 M Bell and Howell tape recorder was used for recording the subjects. The recording was done in a sound treated room. The tone control was kept constant. The microphone was kept an equal distance from all subjects. The volume control was adjusted for best recording level as indicated by the volume indicators on the machine. Tape speed was 7.5 inches per second. The instructions to the subjects were as follows:

I am doing an experiment on the speech of cerebral palsied individuals and would like your help. First I am going to show you some pictures and would like you to tell me what they are. When we finish them, I'll have you repeat some sentences for me. Do you have any questions? All right, tell me what this is.

When the picture articulation test was completed, the subject was given a card containing the Harvard S. I. sentences (Appendix A) and told; "I will read each sentence to you and would like you to repeat it for me." The sentences were read to the subjects before recording so that those having difficulty reading would not be penalized and so that all subjects would be handled equally.

Standard procedures for scoring the articulation test were used by the three speech pathologists who acted as judges. They were asked to indicate all omissions by a dash "-" and all distortions by the letter "D" and to put in the phonetic symbols for all substitutions on the rating sheet provided, (Appendix B). The judges then listened to the recordings of the sentences and made their judgments on the rating sheet given them for this purpose (Appendix C). They were asked to judge voice quality, pitch, and rhythm. Voice quality was defined as that attribute of tone which is determined by the composition of the sound wave. The two factors which determine voice quality are: (1) the original tone as initiated by the vocal cords, and (2) the

selective modification of this tone by the resonating cavities.⁶ Pitch was defined as the characteristic frequency level of the individual voice. Rhythm was defined as that aspect of speech which involves the recurrence in time of similar patterns of pitch, loudness, and duration of tone and pauses.⁷ Rate of speech was determined by word count, i.e., number of words per minute. The volume control of the tape recorder was adjusted for comfortable loudness for the judges. The tone control was kept constant. The total time needed by the speech pathologist for listening to the tapes was twelve hours. Therefore, it was necessary to break the listening sessions into smaller segments in order to avoid excessive fatigue which might influence the judgments. The judges themselves determined their listening times with no single listening period lasting longer than three hours and with frequent rest periods. Each judge did his scoring independently and was allowed to replay the tapes whenever necessary for better judgment.

The following instructions were given to the personnel men:

I am conducting a study on the speech of cerebral

⁶G. Fairbanks, Voice and Articulation Drillbook (New York: Harper and Brothers, 1940), p. 201.

⁷Ibid., p. 160.

palsied individuals, trying to determine the effect of speech on levels of employability. I would like to have you listen to recordings of these people and check the rating scale I have given you on the basis of whether you would hire each person at any of the levels indicated. Please assume that each person has all the other qualifications necessary for any job and rate them only in regard to their speech. You will notice that there are four possible choices. 1. I would not hire. 2. I would hire for a job requiring little speech. 3. I would hire for a job requiring a moderate amount of speech. 4. I would hire for a job requiring a considerable amount of speech. Jobs under category two may be those such as stenographer, shipping clerk, delivery man. Jobs under category four may be those such as salesman, receptionist, secretary. Or they may be any job in your company which would fit any of these categories. I have given each of you a list of the sentences you will hear. Will you please read them so you will be familiar with what you are listening for. If you have any question as to whether an individual should be placed in one category or another and cannot make a decision between the two, check on the line between the two categories in question. Are there any questions?

The descriptive jobs listed for categories two, three, and four were selected by five people from the Vocational Rehabilitation office. These jobs were considered by them as being representative of the description indicated for each category. The sentences were given to the personnel men so that they would not be influenced by increasing familiarity as the listening session advanced. The subjects checked on the line between the categories, indicating the inability of the judge to make a definite decision in that instance, were placed in the category in which

the majority of the judges ranked him. Listening time for the personnel men was a total of one hour and fifteen minutes, with short periods of rest intervening. Judging was done in groups ranging in size from one to fifteen.

Division of the Subjects into Groups

When the ratings of the personnel men were finished, each subject was assigned a rating by counting the number of times he was placed in each rank and choosing that rating assigned by the majority of the personnel men. Table 1 indicates the method used in tabulation and the percentage of agreement of the personnel men.

TABLE 1
 PERCENTAGE OF AGREEMENT ON 1750
 JUDGMENTS BY PERSONNEL MEN RANKING
 LEVELS OF EMPLOYABILITY

Subject Number	1	2	3	4
1		30	5	28
2			7	
3		32	3	
4		31	4	
5	35			
.
.
.
50	.	9	26	.
Total no. of Agreements				1416
Percentage of Agreements				89.02

The percentage of agreement of the personnel men was 89.02 with no rank being more than one away from the majority.

Evaluation of the Measurements

A number count of total articulation errors was made after the subjects were grouped according to the four levels of employability. Perrin⁸ found a correlation coefficient between the rank order obtained from the actual sounds misarticulated and the ranked severity of defective speech by trained judges to be .983. Hudgins and Numbers⁹ found intelligibility to be determined largely by errors of articulation. Falck states, "Either the Articulation Index or Articulation Score correlated significantly with the Information Transfer score. Interestingly enough, the results indicate there is no apparent advantage to evaluating articulation by means of a frequency count index."¹⁰ Also Burgi and Matthews¹¹ found a correlation of .98 between Woods Index and number count of single sounds on an articulation test. Therefore, a number count may justifiably

⁸E. H. Perrin, "The Rating of Defective Speech by Trained and Untrained Observers," Journal of Speech and Hearing Disorders, XIX (September, 1954), 48-51.

⁹C. V. Hudgins and F. C. Numbers, "An Investigation of the Intelligibility of the Speech of the Deaf," Genetic Psychology Monographs, XXV (January, 1942), 289.

¹⁰V. T. Falck, "Selected Factors Related to the Ability of Cleft Palate Speakers to Convey Information," (unpublished Ph. D. dissertation, Dep't. of Speech, The Pennsylvania State University, 1955), p. 38.

¹¹Burgi and Matthews, loc. cit.

be used. The articulation scores for the fifty subjects in this study were determined by adding those sounds upon which there was a three out of three or a two out of three agreement by the speech pathologists as to a sound's incorrectness. The articulation test blanks are shown in Appendix B. Table 2 indicates the percentage of agreement of these judges.

TABLE 2
PERCENTAGES OF AGREEMENT OF 3400
JUDGMENTS OF ARTICULATION BY EACH OF
THREE JUDGES

Subject Number	Unanimous Agreement	Judges 1 and 2 in Agreement	Judges 1 and 3 in Agreement	Judges 2 and 3 in Agreement
1	41	53	50	48
2	62	62	65	66
3	40	46	47	48
4	50	52	48	61
5	61	63	61	63
.
.
.
50	64	65	67	64
Total no. of Agreements	2753	2897	2879	3083
Percentage of Agreements	80.9	85.2	84.6	87.7

A correlation of the total number of articulation errors for each subject as rated by the three judges gives a Pearson's r of .97 between judge 1 and 2, .96 between judge 1 and 3, and .97 between judge 2 and 3. These are highly significant figures.

A four point scale for rhythm was used (Appendix C). The rank of 1 was given for those whose speech rhythm was judged normal, 2 for those whose speech was judged slightly dysrhythmic, 3 for those whose speech was judged moderately dysrhythmic and 4 for those whose speech was judged severely dysrhythmic. The percentage of agreement by the three judges was 83.7 per cent.

Pitch was rated on a three point scale (Appendix C). Pitch was judged to be normal, high, or low. The agreement of the three judges was 80.1 per cent.

Rate was ascertained by an actual count of number of words per minute in the sentences.

An attempt was made to have the judges rate quality, by indicating whether the subject's voice was normal, breathy, harsh, muffled, nasal, denasal or hoarse (Appendix C). The judges could check one or any combination of descriptive ratings. All of the judges remarked that they had a great deal of difficulty making those decisions. At times the quality of an individual subject was such that none of the terms was satisfactory for describing his voice. Other subjects had such a wide fluctuation of quality that a single judge would indicate harsh, muffled, nasal, and denasal for one subject. Ratings on a single subject by all three judges were as follows: subject no. 49, normal; breathy, harsh, nasal, denasal; muffled, denasal;

subject no. 41, nasal; breathy, nasal; harsh; subject no. 40, normal; breathy, denasal; hoarse; subject no. 37, harsh; harsh, nasal, denasal; muffled, denasal; subject no. 18, harsh, nasal, denasal; harsh muffled, nasal, denasal; muffled. A further indication of the judges' difficulty in making a decision on quality is their percentage of agreement. The judges' agreement was 45.3 per cent. Therefore, the rating of quality by use of descriptive terms was considered invalid and the ratings rejected.

Instead of a rating by descriptive terms, a four point scale was substituted (Appendix D). This scale rated quality as 1. normal, 2. slightly deviant from normal, 3. moderately deviant from normal, 4. severely deviant from normal. The judges were asked to listen to the tape recordings of the sentences and to rate each subject's overall quality on this scale.

Analysis of the ratings made on the four point scale for quality shows the judges agreed 68.6 per cent of the time. This is considerably less than their agreements on other ratings and should be taken into consideration when evaluating the scores.

CHAPTER III

RESULTS

Grouping the Subjects

The subjects were placed in the category of employability that corresponded with the decision of the majority of the personnel men. As stated earlier, page 21, the personnel men had an 89.02 percentage of agreement. Using this method of ranking, 14 subjects were placed in group 1, 19 subjects were placed in group 2, 9 subjects were placed in group 3, 8 subjects were placed in group 4. See Table 3.

TABLE 3
RANKING OF SUBJECTS BY PERSONNEL MEN

	Would not employ	Would employ for a job requiring little speech	Would employ for a job requiring a moderate amount of speech	Would employ for a job requiring a considerable amount of speech
No. of Subjects	14	19	9	8

Statistical Procedures

Nonparametric statistical tests were used because of the small size of the samples. The tests used were the Kruskal-Wallis one-way analysis of variance,¹ and the Mann-Whitney U test.² The Kruskal-Wallis one-way analysis of variance by ranks can be used to determine whether k. independent samples are from different populations. This test was used for each measure; articulation, rhythm, rate, pitch, quality. The Mann-Whitney U test is used to test whether two different groups have been drawn from the same population, when there is at least ordinal measurement. This test was used to determine the relationship between the groups i.e., group 1 versus group 2, group 1 versus group 3, group 1 versus group 4, group 2 versus group 3, group 2 versus group 4, group 3 versus group 4. The Mann-Whitney U test was used whenever the results of the Kruskal-Wallis one-way analysis of variance showed that the samples were from different populations.

Articulation Scores

The total articulation score for each subject was obtained by counting the number of misarticulated sounds in the picture articulation test. A sound was considered

¹S. Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., 1956), pp. 184-193.

²Ibid., pp. 116-127.

misarticulated if 3-out-of-3 of the judges, or if 2-out-of-3 of the judges so indicated. Table 4 shows the total articulation scores of each group.

TABLE 4
TOTAL ARTICULATION SCORES

Group 1	Group 2	Group 3	Group 4
63	25	1	0
33	3	0	0
46	27	0	0
53	1	0	1
20	44	1	0
36	2	0	0
60	16	7	0
48	15	1	1
43	51	6	
59	45		
30	11		
40	16		
68	15		
32	23		
	26		
	16		
	1		
	28		
	38		

TABLE 5
RANK ORDER OF ARTICULATION SCORES

Group 1		Group 2		Group 3		Group 4	
Score	Rank	Score	Rank	Score	Rank	Score	Rank
63	49	25	30	1	14	0	5.5
33	36	3	19	0	5.5	0	5.5
46	44	27	32	0	5.5	0	5.5
53	46	1	14	0	5.5	1	14
20	28	44	42	1	14	0	5.5
36	37	2	18	0	5.5	0	5.5
60	48	16	26	7	21	0	5.5
48	45	15	23.5	1	14	1	14
43	41	41	40	6	20		
59	47	45	43				
30	34	11	22				
40	39	16	26				
68	50	15	23.5				
32	35	23	29				
		26	31				
		16	26				
		1	14				
		28	33				
		38	38				
Sum of Ranks	579		530		105		61

Applying the Kruskal-Wallis test to this data gives an H score of 38.02. This is significant at the .001 level of confidence.

$$H = \frac{12}{N(N+1)} \sum_{j=1}^k \frac{R_j^2}{n_j} - 3(N+1)$$

$$H = \frac{12}{50(50+1)} \frac{579^2}{14} + \frac{530^2}{19} + \frac{105^2}{19} + \frac{61^2}{8} - 3(50+1)$$

$$H = .00475 (40216.3) - 3(51)$$

$$H = 38.02, \text{ significant at } .001$$

The Mann-Whitney U test was applied to these groups.

Table 6 shows the ranking between groups 1 and 2.

TABLE 6
RANK ORDER OF GROUP 1 AND 2, ARTICULATION SCORES

Group 1	Group 2
33	26
32	25
31	23
30	21
29	16
28	15
27	14
24	13
22	12
20	9
19	9
18	9
17	6.5
11	6.5
	4
	3
	1.5
	1.5
Sum of Ranks	
341	215

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

$$U = 19 \cdot 14 + \frac{14(14+1)}{2} - 341$$

$$U = 266 + 105 - 341$$

$$U = 30, \text{ significant at } .001$$

Table 7 shows the ranking between groups 1 and 3 on articulation.

TABLE 7
RANK ORDER OF GROUPS 1 AND 3, ARTICULATION

Group 1	Group 3
23	9
22	8
21	6
20	6
19	6
18	2.5
17	2.5
16	2.5
15	2.5
14	
13	
12	
11	
10	
Sum of Ranks	
231	45.0

$U=0$, significant at the .001 level of confidence.

Table 8 shows the ranking between groups 1 and 4.

TABLE 8
RANK ORDER OF GROUPS 1 AND 4, ARTICULATION

Group 1	Group 4
22	7.5
21	7.5
20	3.5
19	3.5
18	3.5
17	3.5
16	3.5
15	3.5
14	3.5
13	
12	
11	
10	
9	
Sum of Ranks	
217	36

$U = 0$, significant at the .001 level of confidence.

Table 9 shows the ranking of groups 2 and 3.

TABLE 9
RANK ORDER OF GROUPS 2 AND 3, ARTICULATION

Group 2	Group 3
28	13
27	12
26	7
25	7
24	7
23	2.5
22	2.5
21	2.5
20	2.5
18	
18	
18	
15.5	
15.5	
14	
11	
10	
7	
7	
Sum of Ranks	350
	56

$U = 11$, significant at the .001 level of confidence.

Table 10 shows the ranking between groups 2 and 4.

TABLE 10
RANK ORDER OF GROUPS 2 AND 4, ARTICULATION

Group 2	Group 4
27	8.5
26	8.5
25	3.5
24	3.5
23	3.5
22	3.5
21	3.5
20	3.5
19	
17	
17	
17	
14.5	
14.5	
13	
12	
11	
8.5	
8.5	
Sum of Ranks 340	38

$U=2$, significant at the .001 level of confidence.

Table 11 shows the ranking of groups 3 and 4.

TABLE 11
RANK ORDER OF GROUPS 3 AND 4, ARTICULATION

Group 3	Group 4
17	13
16	13
13	5
13	5
13	5
5	5
5	5
5	5
5	5
Sum of Ranks	92
	56
U=.253, not significant.	

Rhythm Scores

Rhythm was judged on a 4-point scale from normal to severely dysrhythmic. Subjects were placed in rank 1 (normal) if 3-out-of-3 or 2-out-of-3 of the judges placed him there. The subjects were placed in rank 2 (slightly dysrhythmic), rank 3 (moderately dysrhythmic), rank 4 (severely dysrhythmic) by the same criteria.

Table 12 shows the ratings of the subjects on rhythm.

TABLE 12
RATING OF RHYTHM SCORES

Group 1	Group 2	Group 3	Group 4
4	2	2	1
4	3	2	1
4	3	2	1
4	2	2	1
4	3	1	1
4	2	1	1
4	2	1	1
4	3	1	1
4	3	1	
4	3		
3	2		
3	1		
4	2		
3	2		
	3		
	3		
	3		
	2		

Table 13 shows the rank order of the rhythm scores.

TABLE 13
RANK ORDER OF RHYTHM SCORES

Group 1		Group 2		Group 3		Group 4	
Rating	Rank	Rating	Rank	Rating	Rank	Rating	Rank
4	45	2	21	2	21	1	7.5
4	45	3	33.5	2	21	1	7.5
4	45	3	33.5	2	21	1	7.5
4	45	2	21	2	21	1	7.5
4	45	3	33.5	1	7.5	1	7.5
4	45	2	21	1	7.5	1	7.5
4	45	2	21	1	7.5	1	7.5
4	45	3	33.5	1	7.5	1	7.5
4	45	3	33.5	1	7.5		
4	45	3	33.5				
3	33.5	2	21				
3	33.5	1	7.5				
4	45	2	21				
3	33.5	2	21				
		2	21				
		3	33.5				
		3	33.5				
		3	33.5				
		2	21				
Sum of Ranks							
	595.5		498.0		121.5		60

$H=39$, significant at the .001 level of confidence.

The Mann-Whitney U test was then used to test the differences between the groups on rhythm. Table 14 shows the rank of groups 1 and 2.

TABLE 14
RANK ORDER OF GROUPS 1 AND 2, RHYTHM

Group 1	Group 2
28	16.5
28	16.5
28	16.5
28	16.5
28	16.5
28	16.5
28	16.5
28	16.5
28	16.5
28	6
28	6
16.5	6
16.5	6
16.5	6
	6
	6
	6
	1
Sum of Ranks	
357.5	203.5

$U=13.5$, significant at the .001 level of confidence.

Table 15 shows the ranking of scores of groups 1 and 3 on rhythm.

TABLE 15
RANK ORDER OF GROUPS 1 AND 3, RHYTHM

Group 1	Group 3
18	7.5
18	7.5
18	7.5
18	7.5
18	3
18	3
18	3
18	3
18	3
18	
11	
11	
11	
Sum of Ranks	231
	45

$U=0$, significant at the .001 level of confidence.

Table 16 shows the ranking of scores of groups 1 and 4 on rhythm.

TABLE 16
RANK ORDER OF GROUPS 1 AND 4, RHYTHM

Group 1	Group 4
17	4.5
17	4.5
17	4.5
17	4.5
17	4.5
17	4.5
17	4.5
17	4.5
17	
17	
17	
10	
10	
10	
Sum of Ranks	
217	36

$U=0$, significant at the .001 level of confidence.

Table 17 shows the ranking of scores of groups 2 and 3 on rhythm.

TABLE 17
RANK ORDER OF GROUPS 2 AND 3, RHYTHM

Group 2	Group 3
24	13
24	13
24	13
24	13
24	3.5
24	3.5
24	3.5
24	3.5
24	3.5
13	
13	
13	
13	
13	
13	
13	
13	
3.5	
Sum of Ranks	69.5

$U=24.5$, significant at the .001 level of confidence.

Table 18 shows the ranking of the scores of groups 2 and 4 on rhythm.

TABLE 18
RANK ORDER OF GROUPS 2 AND 4, RHYTHM

Group 2	Group 4
23	5
23	5
23	5
23	5
23	5
23	5
23	5
23	5
14	
14	
14	
14	
14	
14	
14	
14	
14	
5	
Sum of Ranks	
338	40

$U=4$, significant at the .001 level of confidence.

Table 19 shows the ranking of the scores of groups 3 and 4 on rhythm.

TABLE 19
RANK ORDER OF GROUPS 3 AND 4, RHYTHM

Group 3	Group 4
15.5	7
15.5	7
15.5	7
15.5	7
7	7
7	7
7	7
7	7
7	
Sum of Ranks	
97	56

$U=20$, significant at the .117 level of confidence.

Rate Scores

The rate of speech for each subject was obtained by counting the number of words per minute spoken, using the reading of the sentences for this rating. Table 20 shows the rate of speech for each subject.

TABLE 20
RATE OF SPEECH, NUMBER OF WORDS PER MINUTE

Group 1	Group 2	Group 3	Group 4
36	102	126	124
60	79	86	164
79	99	168	168
50	96	175	170
84	42	124	166
40	47	92	168
37	80	75	168
58	126	160	168
97	155	118	
88	78		
56	124		
70	116		
108	90		
42	118		
	108		
	95		
	58		
	44		
	102		

Table 21 shows the ranking of the scores on rate.

TABLE 21
RANK ORDER OF SCORES OF RATE

Group 1		Group 2		Group 3		Group 4	
Score	Rank	Score	Rank	Score	Rank	Score	Rank
36	50	102	22.5	126	12.5	124	15
60	39	79	34.5	86	31	164	9
79	34.5	99	24	168	5	168	5
50	43	96	26	175	1	170	2
84	32	42	46.5	124	15	166	8
40	48	47	44	92	28	168	5
37	49	80	33	75	37	168	5
58	40.5	126	12.5	160	10	168	5
97	25	155	11	118	17.5		
88	30	78	36				
56	42	124	15				
70	38	116	19				
108	20.5	90	29				
42	46.5	118	17.5				
		108	20.5				
		95	27				
		58	40.5				
		44	45				
		102	22.5				
Sum of Ranks							
538.0		526.0		157.0		54	

H=29, significant at the .001 level of confidence.

Table 22 shows the rank order of groups 1 and 2, on rate.

TABLE 22
RANK ORDER OF GROUPS 1 AND 2, RATE

Group 1	Group 2
33	8.5
22	18.5
18.5	10
26	12
16	29.5
31	27
32	17
23.5	2
11	1
15	20
25	3
21	5
6.5	4
29.5	4
	6.5
	13
	23.5
	28
	8.5
Sum of Ranks	
310.0	241.0
U=61, significant at .01 level of confidence.	

TABLE 23
RANK ORDER OF GROUPS 1 AND 3, RATE

Group 1	Group 3
23	14
22	11
21	9
20	6
19	5
18	4
17	3
16	2
15	1
13	
12	
10	
8	
7	
Sum of Ranks	
221	55

$U=10$, significant at the .001 level of confidence.

Table 24 shows the rank order of scores of rate between groups 1 and 4 on rate.

TABLE 24
RANK ORDER OF SCORES GROUPS 1 AND 4, RATE

Group 1	Group 4
22	8
21	7
20	6
19	5
18	4
17	3
16	2
15	1
14	
13	
12	
11	
10	
9	
Sum of Ranks	
217	36
U=0, significant at the .001 level of confidence.	

Table 25 shows the rank order of scores of rate between groups 2 and 3 on rate.

TABLE 25
RANK ORDER GROUPS 2 AND 3, RATE

Group 2	Group 3
28	
27	26
25	22
24	20
23	10.5
21	7.5
19	5.5
18	3
17	2
16	1
15	
14	
13	
12	
10.5	
9	
7.5	
5.5	
4	
Sum of Ranks	
308.5	97.5
U=52.5, not significant.	

Table 26 shows the ranking of the scores of rate between groups 2 and 4 on rate.

TABLE 26
RANK ORDER OF GROUPS 2 AND 4, RATE

Group 2	Group 4
27	10.5
26	7
25	6
24	3.5
23	3.5
22	3.5
21	3.5
20	1
19	
18	
17	
16	
15	
14	
13	
12	
10.5	
9	
8	
Sum of Ranks	
339.5	38.5
U=2.5, significant at the .001 level of confidence.	

Table 27 shows the ranking of groups 3 and 4 on rate.

TABLE 27

RANK ORDER OF GROUPS 3 AND 4, RATE

Group 3	Group 4
17	12.5
16	9
15	8
14	5
12.5	5
11	3
10	5
5	2
1	
Sum of Ranks	
101.5	51.5
U=15.5, not significant.	

Table 30 shows the rank order of groups 1 and 3 on pitch.

TABLE 30
RANK ORDER OF GROUPS 1 AND 3, PITCH

Group 1	Group 3
19	19
19	19
19	19
14	19
14	14
14	6
14	6
6	6
6	6
6	
6	
6	
6	
Sum of Ranks	155
	114
U=76, not significant.	

Table 31 shows the rank order of groups 1 and 4 on pitch.

TABLE 31
RANK ORDER OF GROUPS 1 AND 4, PITCH

Group 1	Group 4
22	17
22	7.5
22	7.5
17	7.5
17	7.5
17	7.5
17	7.5
7.5	7.5
7.5	
7.5	
7.5	
7.5	
7.5	
7.5	
Sum of Ranks	
186.5	69.5
$U=30.5$, not significant.	

Table 32 shows the rank order of groups 2 and 3 on pitch.

TABLE 32
RANK ORDER OF GROUPS 2 AND 3, PITCH

Group 2	Group 3
26	26
20.5	26
20.5	26
20.5	26
20.5	20.5
20.5	9
9	9
9	9
9	9
9	
9	
9	
9	
9	
9	
9	
9	
Sum of Ranks	
245.5	160.5
U=115.5, not significant.	

Table 34 shows the rank order of groups 3 and 4 on pitch.

TABLE 34
RANK ORDER OF GROUPS 3 AND 4, PITCH

Group 3	Group 4
15.5	12.5
15.5	6
15.5	6
15.5	6
15.5	6
6	6
6	6
6	6
6	
Sum of Ranks	
98.5	54.5
U=18.5, not significant.	

Quality Scores

Table 35 shows the scores on quality.

TABLE 35
SCORES OF QUALITY RATINGS

Group 1	Group 2	Group 3	Group 4
4	3	3	2
4	3	2	2
3	2	2	1
4	4	2	1
4	3	2	1
4	3	2	1
4	3	2	2
4	3	2	1
4	3	4	
4	4		
4	4		
4	4		
4	3		
4	2		
	3		
	3		
	3		
	3		
	2		
	3		

Table 36 shows the rank order of the quality ratings.

TABLE 36
RANK ORDER OF SCORES OF QUALITY RATINGS

Group 1	Group 2	Group 3	Group 4
41.5	41.5	41.5	12
41.5	41.5	25.5	12
41.5	41.5	12	12
41.5	41.5	12	3
41.5	25.5	12	3
41.5	25.5	12	3
41.5	25.5	12	3
41.5	25.5	12	3
41.5	25.5	12	
41.5	25.5		
41.5	25.5		
41.5	25.5		
25.5	25.5		
	25.5		
	25.5		
	12		
	12		
	12		
Sum of Ranks	565	508	151
			51

$H=60$, significant at the .001 level of confidence.

Table 37 shows the rank order of groups 1 and 2 on quality.

TABLE 37
RANK ORDER OF GROUPS 1 AND 2, QUALITY

Group 1	Group 2
25	25
25	25
25	25
25	25
25	10
25	10
25	10
25	10
25	10
25	10
25	10
25	10
25	10
10	10
	10
	10
	2
	2
	2
Sum of Ranks	226
U=36, significant at the .001 level of confidence.	

Table 38 shows the rank order of groups 1 and 3 on quality.

TABLE 38
RANK ORDER OF GROUPS 1 AND 3, QUALITY

Group 1	Group 3
16.5	16.5
16.5	8.5
16.5	4
16.5	4
16.5	4
16.5	4
16.5	4
16.5	4
16.5	4
16.5	
16.5	
16.5	
16.5	
8.5	
Sum of Ranks	
223	53
U=8, significant at the .001 level of confidence.	

Table 39 shows the rank order of groups 1 and 4 on quality.

TABLE 39
RANK ORDER OF GROUPS 1 AND 4, QUALITY

Group 1	Group 2
16	7
16	7
16	7
16	3
16	3
16	3
16	3
16	3
16	
16	
16	
16	
16	
9	
Sum of Ranks	
217	36
U=0, significant at the .001 level of confidence.	

Table 40 shows the rank order of groups 2 and 3 on quality.

TABLE 40
RANK ORDER OF GROUPS 2 AND 3, QUALITY

Group 2	Group 3
26	26
26	17
26	5.5
26	5.5
17	5.5
17	5.5
17	5.5
17	5.5
17	5.5
17	5.5
17	
17	
17	
17	
17	
17	
5.5	
5.5	
5.5	
Sum of Ranks	
324.5	81.5
U=36.5, significant of the .01 level of confidence.	

Table 41 shows the rank order of groups 2 and 4 on quality.

TABLE 41
RANK ORDER OF GROUPS 2 AND 4, QUALITY

Group 2	Group 4
25.5	8.5
25.5	8.5
25.5	8.5
25.5	3
17.5	3
17.5	3
17.5	3
17.5	3
17.5	
17.5	
17.5	
17.5	
17.5	
17.5	
17.5	
8.5	
8.5	
8.5	
Sum of Ranks	
337.5	40.5

$U=4.5$, significant at the .001 level of confidence.

Table 42 shows the rank order of groups 3 and 4 on quality.

TABLE 42
RANK ORDER OF GROUPS 3 AND 4, QUALITY

Group 3	Group 4
17	10.5
16	10.5
10.5	10.5
10.5	3
10.5	3
10.5	3
10.5	3
10.5	3
10.5	
Sum of Ranks	99

$U=10.5$, significant at the .01 level of confidence.

A breakdown of articulation score into omissions, distortions, and substitutions, yielded no significant predictive measures for omissions and substitutions. Nor was place of articulation, initial, medial or final, a predictive measure.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

Fifty adult cerebral palsied individuals were used as subjects for this experiment. Two sets of tape recordings were made of their speech. The first was a recording of a picture articulation test. The second was a recording of the subjects repeating a set of sentences.

Thirty-five personnel men listened to the recordings of the sentences and rated the subjects on employability. The subjects were placed in the employability category assigned them by the majority of the raters.

Judgments of the articulation test were made by three expert judges as to the correctness of each consonant sound in each position. An articulation score was then computed by making a number count of the sounds misarticulated.

Judgments of rhythm, pitch, and quality were made by the same three judges, using the tape recording of the sentences as samples of connected speech. Rate was scored by a number count of words per minute, as indicated by the recording of the sentences.

A comparison between the groups of subjects, in each employability level, was made for each of the factors of speech.

The results of these comparisons indicate that for these subjects, articulation, rhythm, rate, and quality are significant predictors of employability levels. Pitch was not as accurate a measure.

The statistical analysis shows that articulation, rhythm, rate, and quality are significant at the .001 level of confidence as an over-all measure. Quality is significant as a predictive measure between all groups. Articulation and rhythm are significant as predictive measures between all groups except between groups 3 and 4. Rate is significant as a predictive measure between all groups except between groups 2 and 3 and groups 3 and 4. Pitch, as an over-all measure has a significance level of only .2 and is not significant as a predictive measure between any of the groups.

The significance of the ratings on quality should be accepted with a qualifying notation that the judges' agreement on the quality ratings was only 68 per cent.

The fact that only quality is a significant predictive measure between groups 3 and 4 should also be noted. Examination of the composite ratings (Appendix E) reveals that all except one of the subjects in group 3 were downgraded in at least two categories.

Thus, it may be said that based on a sample of 50 peo-

ple, it is possible to make an objective evaluation of the speech of a cerebral palsied individual, using the criteria stated, to determine employability levels where there is some degree of communication needed. Also, it would be possible to indicate those individuals non-employable where some degree of communication is necessary.

Conclusions

The results of this particular experiment of the speech of fifty adult cerebral palsied individuals, indicate:

1. Personnel men agree, with a high degree of accuracy, on levels of employability with regard to an individual's speech.
2. An articulation test is a valid predictor of employability levels of cerebral palsied individuals.
3. Rhythm is a valid indicator of employability levels of these subjects.
4. Rate is a valid indicator of levels of employability.
5. Pitch may, in some instances, be a valid factor of employability levels, but is, for the most part, a doubtful measure.
6. A quality rating, based on impressions varying from normal to severely deviant from normal, may be a valid predictor of levels of employability.

By utilizing the results obtained from this study, profiles may be drawn for each level of employability studied. The profiles are as follows:

FIGURE 1

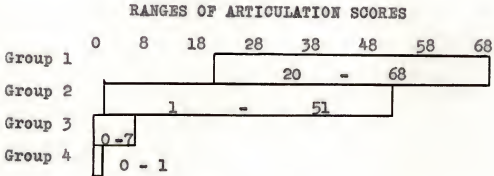


FIGURE 2

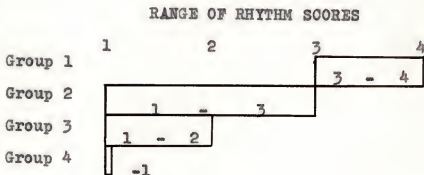


FIGURE 3

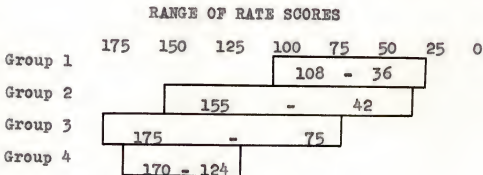


FIGURE 4
RANGE OF PITCH SCORES

	1	2	3
Group 1	1	-	3
Group 2	1	-	3
Group 3	1	-	3
Group 4	1	-	2

FIGURE 5
RANGE OF QUALITY SCORES

	1	2	3	4
Group 1			3	- 4
Group 2		2	-	4
Group 3		2	-	4
Group 4	1	-	2	

Therefore, if a cerebral palsied individual were rated on the five categories listed and his scores placed on the profiles, it would be possible to judge his employability level. His level of employability would be that level in which all of his scores fit. Thus if the individual had scores on pitch, quality, rate, and rhythm which fit in group 3, but his articulation score fit in group 2, he probably would not be employable above group 2. Of course, care should be taken in evaluating borderline cases. Quality and pitch scores are best used only in differentiating between groups 4 and 3.

The highly significant results obtained in this study, based upon a limited number of subjects, indicate that ratings on articulation, rhythm and rate may be independent predictors of employability. Pitch and quality may be useful at the extremes. When all these measures are used in combination, the validity may be increased considerably.

Therefore, taking into consideration the limitations of this study, it may be said that such a set of rating scales as used in this experiment may be useful in ascertaining employability levels of cerebral palsied individuals as far as their speech is concerned. This, of course, should be accepted with the reservation of being substantiated by further research with a larger population.

APPENDICES

APPENDIX A

1. Glue the sheet to the dark blue background.
2. The juice of lemons makes fine punch.
3. A rod is used to catch pink salmon.
4. Never kill a snake with your bare hands.
5. The girl at the booth sold fifty bonds.
6. Press the pants and sew a button on the vest.
7. For quick cleaning, buy a hemp rug.
8. Hoist the load to your left shoulder.
9. Red pencil the words spelled wrong.
10. Mend the coat before you go out.
11. The meal was cooked before the bell rang.

APPENDIX B

ARTICULATION TEST

Mark substitutions with sound substituted;

Omissions (-); Distortions (D)

<u>p</u> ig	a <u>p</u> ple	<u>p</u> ipe
<u>b</u> oy	b <u>a</u> by	kn <u>o</u> b
<u>m</u> an	h <u>a</u> mm <u>e</u> r	co <u>m</u> b
<u>t</u> able	b <u>u</u> tter	bo <u>a</u> t
<u>d</u> og	ra <u>d</u> io	be <u>d</u>
<u>k</u> nife	ba <u>n</u> ana	teleph <u>o</u> ne
<u>c</u> ow	coo <u>k</u> ie	bo <u>o</u> k
<u>g</u> irl	sug <u>a</u> r	fla <u>g</u>
	mo <u>n</u> key	ri <u>n</u> g
<u>s</u> oup	pe <u>n</u> cil	dr <u>e</u> ss
<u>z</u> ebra	sc <u>i</u> ssors	ey <u>e</u> s
<u>s</u> hoe	was <u>h</u> ing machine	fi <u>s</u> h
	mea <u>s</u> uring cup	gar <u>a</u> ge
<u>c</u> hair	ket <u>ch</u> up	wa <u>t</u> ch
<u>j</u> ello	sol <u>d</u> ier	ora <u>n</u> ge
<u>f</u> ork	eleph <u>a</u> nt	lea <u>f</u>
<u>v</u> acuum cleaner	ov <u>e</u> n	oli <u>v</u> e
<u>t</u> humb	bat <u>h</u> tub	tee <u>t</u> h
<u>t</u> his one	fea <u>t</u> her	smoo <u>t</u> h
<u>r</u> ope	carro <u>t</u>	car
<u>l</u> adder	pillow	ba <u>l</u> l
<u>y</u> awn	on <u>i</u> on	
<u>h</u> at	ligh <u>t</u> house	
<u>w</u> agon	sandw <u>i</u> ch	
<u>w</u> heel		

APPENDIX C

Subject no. _____

- A. Quality: normal breathy harsh muffled nasal denasal
hoarse
- B. Pitch: normal high low
- C. Rhythm: normal slightly moderately severely
dysrhythmic dysrhythmic dysrhythmic

Subject no. _____

- A. Quality: normal breathy harsh muffled nasal denasal
hoarse
- B. Pitch: normal high low
- C. Rhythm: normal slightly moderately severely
dysrhythmic dysrhythmic dysrhythmic

Subject no. _____

- A. Quality: normal breathy harsh muffled nasal denasal
hoarse
- B. Pitch: normal high low
- C. Rhythm: normal slightly moderately severely
dysrhythmic dysrhythmic dysrhythmic

Subject no. _____

- A. Quality: normal breathy harsh muffled nasal denasal
hoarse
- B. Pitch: normal high low
- C. Rhythm: normal slightly moderately severely
dysrhythmic dysrhythmic dysrhythmic

APPENDIX D

QUALITY

Subject Number	Normal	Slightly deviant	Moderately deviant	Severely deviant
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
.				
.				
.				
.				
.				
50				

APPENDIX E

COMPOSITE RATINGS FOR EACH SUBJECT BY ALL JUDGES

ON ALL FACTORS

Subject Number	Rating of Personnel Men	Articulation Score	Rhythm Score	Rate Score	Quality Score	Pitch Score
1	2	38	2	100	3	1
2	4	1	1	124	2	1
3	2	28	3	79	3	1
4	2	1	3	99	2	1
5	1	68	4	36	4	2
6	1	40	3	60	4	1
7	2	16	3	96	4	2
8	1	30	3	79	3	3
9	2	26	2	120	3	1
10	2	23	2	106	3	1
11	4	0	1	164	2	2
12	2	15	2	80	3	1
13	2	16	1	126	3	1
14	3	6	1	126	3	3
15	4	1	1	168	1	1
16	2	11	2	155	3	2
17	2	45	3	78	4	2
18	1	59	4	50	4	2
19	2	40	3	124	4	1
20	1	32	3	84	4	1
21	2	15	3	116	4	2
22	4	0	1	170	1	1
23	3	1	1	86	2	1
24	3	7	1	168	2	1
25	1	43	4	40	4	1

COMPOSITE RATINGS FOR EACH SUBJECT BY ALL JUDGES
ON ALL FACTORS

Subject Number	Rating of Personnel Men	Articulation Score	Rhythm Score	Rate Score	Quality Score	Pitch Score
26	2	76	2	90	3	1
27	1	48	4	37	4	1
28	2	2	2	118	2	1
29	1	60	4	58	4	1
30	4	1	1	166	1	1
31	1	36	4	97	4	2
32	1	20	4	88	4	3
33	2	44	3	108	3	3
34	3	0	1	175	2	3
35	3	1	1	124	2	1
36	2	1	2	95	3	1
37	2	27	3	58	3	2
38	2	3	3	44	2	1
39	1	53	4	56	4	2
40	4	0	1	168	1	1
41	3	0	2	92	2	3
42	4	0	1	168	2	1
43	1	46	4	70	4	1
44	4	0	1	168	1	1
45	1	33	4	108	4	1
46	1	63	4	42	4	3
47	3	0	2	75	2	1
48	3	0	2	160	2	2
49	2	25	2	102	3	1
50	3	1	2	118	4	2

BIBLIOGRAPHY

Books

- Allen, R. M., et al. Proceedings of the Postdoctoral Workshop in Psychological Services for the Cerebral Palsied. Coral Gables: University of Miami Press, 1959.
- Brinn, C., and Smith, E. E. Opportunities Limited. San Francisco: California Society for Crippled Children, 1951.
- Cardwell, V. E. Cerebral Palsy. New York: The North River Press, Inc., 1956.
- Colson, J. H. C. The Rehabilitation of the Injured. London: Cassell and Co. Ltd., 1944.
- Conquering Physical Handicaps. Sidney: The Australian Advisory Council for the Physically Handicapped, 1958.
- Cruickshank, W. M., and Raus, G. M. (ed.). Cerebral Palsy. Syracuse: Syracuse University Press, 1955.
- Curtis, L. W. Vocational Placement of the Cerebral Palsied. New York: United Cerebral Palsy of New York City, Inc., 1954.
- Davis, H. (ed.). Hearing and Deafness: A Guide for Laymen. New York: Rinehart Books, Inc., 1947.
- Fairbanks, G. Voice and Articulation Drillbook. New York: Harper and Brothers, 1940.
- Glick, S. J. Vocational, Educational and Recreational Needs of the Cerebral Palsied Adult. New York: United Cerebral Palsy of New York City, Inc., 1953.
- Hamilton, K. W. Counseling the Handicapped in the Rehabilitation Process. New York: The Ronald Press, 1950.
- Huber, M., and Unger, D. Cerebral Palsy Speech Evaluation and Progress Chart. New York: New York Association for the Crippled Child, 1950.

Occupational Planning for Young Men and Women with Cerebral Palsy; A Parent Guide. New York United Cerebral Palsy Associations, Inc., 1953.

Osler, W. The Cerebral Palsies of Children, A Clinical Study from the Infirmary of Nervous Diseases. Philadelphia: P. Blakiston and Co., 1889.

Proceedings of the Case Demonstration Conference on the Vocational Problems of the Adult with Cerebral Palsy. New York: United Cerebral Palsy Associations, Inc., 1953.

Siegel, S. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Co. Inc., 1956.

Super, D. E. Appraising Vocational Fitness. New York: Harper and Brothers, 1949.

Travis, L. E. (ed.). Handbook of Speech Pathology. New York: Appleton-Century-Crofts, Inc., 1957.

Articles and Periodicals

Achilles, R. F. "Communicative Anomalies of Individuals with Cerebral Palsy," Cerebral Palsy Review, XVI (September, 1955), 15-24.

———, "Communicative Anomalies of Individuals with Cerebral Palsy," Cerebral Palsy Review, XVII (January, 1956), 19-26.

Allen, G. M., et al. "Guidance Activities for Realistic Vocational Choices," Cerebral Palsy Review, XVII (September, 1956), 127-129.

Avery, B. A., et al. "Looking Ahead Vocationally," Cerebral Palsy Review, XVII (September, 1956), 125-126.

Berger, C. C. "Subjective Observations on Cerebral Palsy," Journal of Speech Disorders, X (March, 1945), 297-302.

———, "Through a Glass Darkly," Spastic Review, V (June, 1944), 48-51.

- Berko, F. G. "Classroom Case Studies" Cerebral Palsy Review, XV (September, 1954), 7-10.
- _____, and Berko, M. J. "An Abstract of the Adult Occupational Inventory," Cerebral Palsy Review, XVII (September, 1956), 119, 142.
- Bierma, A. "The Occupational Therapists Viewpoint," Cerebral Palsy Review, XVII (January, 1956), 18.
- Burgi, E. J., and Matthews, J. "Predicting Intelligibility of Cerebral Palsied Speech," Journal of Speech and Hearing Research, I (December, 1958), 331-343.
- Christman, D., et al. "Counseling Problems," Cerebral Palsy Review, XVII (September, 1956), 130-131.
- Grothers, B., and Richmond, R. S. The Natural History of Cerebral Palsy. Cambridge: Harvard University Press, 1959.
- Deaver, G. G. "Life Adjustment for the Cerebral Palsied," Nervous Child, VIII (April, 1949), 222-225.
- Fay, T. "Cerebral Palsy: Medical Considerations and Classification," American Journal of Psychiatry, CVII (September, 1950), 180-183.
- _____, "Desperately Needed - Research in Cerebral Palsy," Cerebral Palsy Review, XIV (March, 1953), 4, 11, 13, 15.
- Fleischer, E. "Developing Occupational Information Programs for Adults with Cerebral Palsy," Cerebral Palsy Review, XV (September, 1954), 4-6.
- _____, "Guidance and Rehabilitation in Cerebral Palsy," Cerebral Palsy Review, XVII (September, 1956), 120, 124.
- Harvey, V. K., and Luongo, E. P. "Physical Capacity for Work: Principles of Industrial Physiology and Psychology Related to the Evaluation of the Working Capacity of the Physically Impaired," Occupational Medicine, I (January, 1946), 1-47.

- Hedges, T. A. "The Relationship Between Speech Understandability and the Diadochokinetic Rates of Certain Speech Musculatures among Individuals With Cerebral Palsy," Speech Monographs, XXIII (March, 1956), 144-145.
- Heltman, H. J., and Preacher, G. M. "Misarticulation and Diadochokinesis in the Spastic Paralytic," Journal of Speech Disorders, VIII (June, 1943), 137-145.
- Hood, P. N. "A Study of the Speech Development and Related Factors in Spastic Hemiplegia," Speech Monographs, XXI (June, 1954), 209-210.
- Hudgins, C. V., and Numbers, F. C. "An Investigation of the Intelligibility of the Speech of the Deaf," Genetic Psychology Monographs, XXV (January, 1942), 289-292.
- Jansson, K. "The Employment of Handicapped Workers in Industry," International Labour Review, XLVIII (August, 1955), 2-25.
- Kilbane, E. F. "Survey of Occupations for C. P.'s.," Cerebral Palsy Review, XI (July, 1950), 4-5, 9-11.
- Leith, W. R. "The Role of Research in the Clinical Program for the Individual with Cerebral Palsy," Cerebral Palsy Review, XVI (March, 1955), 8-10.
- Leith, W. R., and Steer, M. D. "Comparison of Judged Speech Characteristics of Athetoids and Spastics," Cerebral Palsy Review, XIX (September, 1958), 15-20.
- Lesser, M. S., and Darling, R. C. "Factors Prognostic for Vocational Rehabilitation Among the Physically Handicapped," Archives of Physical Medicine and Rehabilitation, XXXIV (February, 1953), 73-81.
- Little, W. J. "On the Influence of Abnormal Parturition, Difficult Labor, Premature Birth, and Asphyxia Neonatorum, on the Mental and Physical Condition of the Child, Especially in Relation to Deformities," Lancet, II (October, 1861), 378-380.

- Mecham, M. J. "Complexities in Communication of the Cerebral Palsied," Cerebral Palsy Review, XV (February, 1954), 9-11.
- McCarthy, J. J. "A Test for the Identification of Defects in Language Usage among Young Cerebral Palsied Children," Cerebral Palsy Review, XXI (January, 1960), 3-5.
- McGuire, L. "Sheltered Workshops and Home Industries under the Federal Wage and Hour Law," Crippled Child, XXX (August, 1952), 6-8.
- Moed, M., and Klinecicz, W. "A Dynamic Community Approach to the Problems of Individuals Who Have Cerebral Palsy," Cerebral Palsy Review, XVII (May, 1956), 9-11.
- Odoroff, M. E. "Vocational Rehabilitation for the Cerebral Palsied," Nervous Child, VIII (April, 1949), 214-221.
- Palmer, M. F. "Recent Advances in the Scientific Study of Language Disorders in Cerebral Palsy," Cerebral Palsy Review, XV (March, 1954), 3-6.
- _____, "Spastic Paralysis from the Point of View of the Speech Pathologist," Journal of Speech Disorders, IV (December, 1939), 294-296.
- _____, "Speech Disorders in Cerebral Palsy," Nervous Child, VIII (April, 1949), 193-202.
- Perrin, E. H. "The Rating of Defective Speech by Trained and Untrained Observers," Journal of Speech and Hearing Disorders, XIX (September, 1954), 48-51.
- Rusalew, H. "Vocational Adjustment of the Handicapped Child," Cerebral Palsy Review, XV (January, 1954) 11-13.
- Rutherford, B. R. "Frequency of Articulation Substitutions in Children Handicapped by Cerebral Palsy," Journal of Speech Disorders, IV (September, 1939), 285-287.
- Snedecor, J. C. "The Speech Correctionist on the Cerebral Palsied Team," Journal of Speech and Hearing Disorders, XIII (March, 1948), 67-70.

- Spriestersbach, D. C., and Curtis, J. F. "Misarticulation and the Discrimination of Speech Sounds," The Quarterly Journal of Speech, XXXVII (December, 1951), 483-491.
- Whitehouse, F. A. "Cerebral Palsy and Vocational Habilitation," Cerebral Palsy Review, XIV (July, 1953), 7, 11, 15.
- _____, "Teamwork: Clinical Practice in Rehabilitation," Exceptional Children, XIX (January, 1953), 143-153.
- _____, "Vocational Training in a Rehabilitation Center," Journal of Rehabilitation, XVII (January, 1951), 3-8.
- _____, "When Does Vocational Preparation Start," Cerebral Palsy Review, XII (January, 1951), 7-8.
- Wolfe, W. G. A. "A Comprehensive Evaluation of Fifty Cases of Cerebral Palsy," Journal of Speech and Hearing Disorders, XV (September, 1950), 234-251.
- Wright, H. "Reliability of Evaluations During Basic Articulation and Stimulation Testing," Journal of Speech and Hearing Disorders, Monograph Supplement IV (January, 1954), 3-21.

Reports

- Abrams, M. H., et al. "Speech in Noise: a Study of the Factors Determining Its Intelligibility." Psycho-Acoustic Laboratory, Harvard University, O S R D report No. 4023, P B 19805, 1944.

Unpublished Material

- Beach, M. N. "An Investigation of Some of the Factors which may Influence the Development of Speech and Language in Cerebral Palsied Children." Unpublished Master's thesis, Syracuse University, New York, 1953.

Falck, V. "Selected Factors Related to the Ability of Cleft Palate Speakers to Convey Information." Unpublished Ph.D. dissertation, the Pennsylvania State University, 1955.

Institute for the Crippled and Disabled. "Cerebral Palsy Work Classification and Evaluation Report." New York, 1959. (Mimeographed.)

Institute for the Crippled and Disabled. "Evaluating the Vocational Potential of the Cerebral Palsied." New York, 1957. (Mimeographed.)

Richards, E. "A Study of a Selected Group of Cerebral Palsied Persons to Determine Minimal Occupational Profiles and Abilities Associated with Vocational Success." Unpublished Ph.D. dissertation, Indiana University, 1955.

United Cerebral Palsy Association of Miami, Inc. "Work Classification and Evaluation Report." Miami, 1959. (Mimeographed.)

BIOGRAPHICAL NOTE

Jack F. Bensen was born on January 4, 1923 in Chicago, Illinois. He received his Bachelor of Arts degree at the University of Miami, Coral Gables, Florida, in 1949, and his Master of Arts degree at West Virginia University, Morgantown, in 1951.


In September, 1951 he was appointed speech clinician at the University of Florida. At the present time the writer is an Assistant Professor of Speech at the University of Miami and Speech Consultant in the Speech and Hearing Clinic.

The degree of Doctor of Philosophy in speech was granted to Jack F. Bensen by the University of Florida on August 13, 1960.

The writer is a member of Sigma Alpha Eta and Tau Kappa Alpha. He is also a member of the Florida Speech Association, the Florida Speech and Hearing Association, the Southern Speech Association, the Speech Association of America, and the American Speech and Hearing Association.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August 13, 1960



Dean, College of Arts and
Sciences

Dean, Graduate School

SUPERVISORY COMMITTEE:

